AMENDMENTS TO THE CLAIMS

The claims in this listing will replace all prior versions, and listings, of claims in the application.

1. (Currently Amended) An orthogonal modulation device comprising:

an adding means that outputs a pseudo noise superimposed signal obtained by adding a pseudo noise to a user signal;

a signal conversion means that mixes the pseudo noise superimposed signal with a local signal at a predetermined local frequency, and outputs a converted signal;

a phase shifting means that outputs a phase shifted local signal obtained by shifting the phase of the local signal;

a phase shifted local signal multiplying means that multiplies the converted signal by the phase shifted local signal; and

a correlating means that obtains a correlation between an output from said ~~sad~~ phase shifted local signal multiplying means and the pseudo noise.

2. (Original) The orthogonal modulation device according to claim 1, wherein said correlating means comprises:

a pseudo noise multiplying means that multiplies the output from said phase shifted local signal multiplying means by the pseudo noise; and

an integrating means that integrates an output from said pseudo noise multiplying means, and outputs an integrated signal.

3. (Original) The orthogonal modulation device according to claim 2, wherein an integration interval of said integrating means is sufficiently longer than the period of the local signal.

4. (Original) The orthogonal modulation device according to claim 2, wherein

the integration interval of said integrating means is sufficiently longer than the period of the pseudo noise; and

the period of the pseudo noise is sufficiently longer than the period of the local signal.

5. (Original) The orthogonal modulation device according to claim 2, comprising:

an error measurement means that measures a DC offset error, a phase error, and an amplitude error in the output from said integrating means.

6. (Original) The orthogonal modulation device according to claim 5, wherein said error measurement means neglects at least one of the DC offset error, the phase error, and the amplitude error, and measures errors which are not neglected.

7. (Original) The orthogonal modulation device according to claim 1, wherein the pseudo noise is smaller than the user signal.

8. (Original) The orthogonal modulation device according to claim 7, wherein the pseudo noise is approximately equal to a floor noise.

9. (Original) The orthogonal modulation device according to claim 1 wherein the user signal includes an I signal and a Q signal, comprising:

a pseudo noise addition subject signal selecting means that selects whether the pseudo noise is added to the I signal or the Q signal.

10. (Original) The orthogonal modulation device according to claim 1, comprising:

a first subtracting means that subtracts the user signal from the output from said phase shifted local signal multiplying means, said pseudo noise multiplying means multiplying an output from said first subtracting means by the pseudo noise.

11. (Original) The orthogonal modulation device according to claim 10 wherein the user signal includes an I signal and a Q signal, comprising:

a pseudo noise addition subject signal selecting means that selects whether the pseudo noise is added to the I signal or the Q signal; and

a subtraction subject signal selecting means that selects the user signal to which the pseudo noise addition subject signal selecting means has selected to add the pseudo noise as the user signal to be supplied to said first subtracting means.

12. (Original) The orthogonal modulation device according to claim 1, comprising:

a second subtracting means that subtracts a signal obtained by mixing the user signal and the local signal from the converted signal, said phase shifted local signal multiplying means multiplying a signal output from said second subtracting means by the phase shifted local signal.

13. (Original) The orthogonal modulation device according to claim 12 wherein the user signal includes an I signal and a Q signal, comprising:

a pseudo noise addition subject signal selecting means that selects whether the pseudo noise is added to the I signal or the Q signal; and

a subtraction subject signal selecting means that selects the user signal to which the pseudo noise addition subject signal selecting means has selected to add the pseudo noise as the user signal to be supplied to said second subtraction means.

14. (Previously Presented) An orthogonal modulation method comprising:

an adding step of outputting a pseudo noise superimposed signal obtained by adding a pseudo noise to a user signal;

a signal conversion step of mixing the pseudo noise superimposed signal with a local signal at a predetermined local frequency, and outputs a converted signal;

a phase shifting step of outputting a phase shifted local signal obtained by shifting the phase of the local signal;

a phase shifted local signal multiplying step of multiplying the converted signal by the phase shifted local signal;

a correlating step of obtaining a correlation between an output from said phase shifted local signal multiplying step and the pseudo noise; and

an error measurement step of measuring an error of said user signal based on an output from said correlating step.

15. (Previously Presented) A program of instructions for execution by a computer to perform an error measurement process of an orthogonal modulation device having: an adding means that outputs a pseudo noise superimposed signal obtained by adding a pseudo noise to a user signal; a signal conversion means that mixes the pseudo noise superimposed signal with a local signal at a predetermined local frequency, and outputs a converted signal; a phase shifting means that outputs a phase shifted local signal obtained by shifting the phase of the local signal; a phase shifted local signal multiplying means that multiplies the converted signal by the phase shifted local signal; and a correlating means that obtains a correlation between an output from said phase shifted local signal multiplying means and the pseudo noise, said error measurement process comprising:

an error measurement step of measuring an error of said user signal based on an output from said correlating means.

16. (Previously Presented) A computer-readable medium having a program of instructions for execution by a computer to perform an error measurement process of an orthogonal modulation device having: an adding means that outputs a pseudo noise

superimposed signal obtained by adding a pseudo noise to a user signal; a signal conversion means that mixes the pseudo noise superimposed signal with a local signal at a predetermined local frequency, and outputs a converted signal; a phase shifting means that outputs a phase shifted local signal obtained by shifting the phase of the local signal; a phase shifted local signal multiplying means that multiplies the converted signal by the phase shifted local signal; and a correlating means that obtains a correlation between an output from said phase shifted local signal multiplying means and the pseudo noise, said error measurement process comprising:

an error measurement step of measuring an error of said user signal based on an output from said correlating means.

17. (Original) A modulation device comprising:

an adding means that outputs a pseudo noise superimposed signal obtained by adding a pseudo noise to a user signal; and

a correlating means that obtains a correlation between a modulated signal obtained by modulating an output from said adding means and the pseudo noise.

18. (Previously Presented) An orthogonal modulation device comprising:

an adder that outputs a pseudo noise superimposed signal obtained by adding a pseudo noise to a user signal;

a signal converter that mixes the pseudo noise superimposed signal with a local signal at a predetermined local frequency, and outputs a converted signal;

a phase shifter that outputs a phase shifted local signal obtained by shifting the phase of the local signal;

a phase shifted local signal multiplier that multiplies the converted signal by the phase shifted local signal; and

a correlator that obtains a correlation between an output from the phase shifted local signal multiplier and the pseudo noise.

19. (Previously Presented) The orthogonal modulation device according to claim 18, wherein the correlator comprises:

a pseudo noise multiplier that multiplies the output from the phase shifted local signal multiplier by the pseudo noise; and

an integrator that integrates an output from the pseudo noise multiplier, and outputs an integrated signal.

20. (Previously Presented) The orthogonal modulation device according to claim 19, wherein an integration interval of the integrator is sufficiently longer than the period of the local signal.

21. (Previously Presented) The orthogonal modulation device according to claim 19, wherein

the integration interval of the integrator is sufficiently longer than the period of the pseudo noise; and

the period of the pseudo noise is sufficiently longer than the period of the local signal.

22. (Previously Presented) The orthogonal modulation device according to claim 19, comprising:

an error measurement section that measures a DC offset error, a phase error, and an amplitude error in the output from the integrator.

23. (Previously Presented) The orthogonal modulation device according to claim 22, wherein the error measurement section neglects at least one of the DC offset error, the phase error, and the amplitude error, and measures errors which are not neglected.

24. (Previously Presented) The orthogonal modulation device according to claim 18, wherein the pseudo noise is smaller than the user signal.

25. (Previously Presented) The orthogonal modulation device according to claim 24, wherein the pseudo noise is approximately equal to a floor noise.

26. (Previously Presented) The orthogonal modulation device according to claim 18, wherein the user signal includes an I signal and a Q signal, comprising:

a pseudo noise addition subject signal selector that selects whether the pseudo noise is added to the I signal or the Q signal.

27. (Previously Presented) The orthogonal modulation device according to claim 18, comprising:

a first subtractor that subtracts the user signal from the output from the phase shifted local signal multiplier, the pseudo noise multiplier multiplying an output from the first subtractor by the pseudo noise.

28. (Previously Presented) The orthogonal modulation device according to claim 27 wherein the user signal includes an I signal and a Q signal, comprising:

a pseudo noise addition subject signal selector that selects whether the pseudo noise is added to the I signal or the Q signal; and

a subtraction subject signal selector that selects the user signal to which the pseudo noise addition subject signal selector has selected to add the pseudo noise as the user signal to be supplied to the first subtractor.

29. (Previously Presented) The orthogonal modulation device according to claim 18, comprising:

a second subtractor that subtracts a signal obtained by mixing the user signal and the local signal from the converted signal, the phase shifted local signal multiplier multiplying a signal output from the second subtractor by the phase shifted local signal.

30. (Previously Presented) The orthogonal modulation device according to claim 29 wherein the user signal includes an I signal and a Q signal, comprising:

a pseudo noise addition subject signal selector that selects whether the pseudo noise is added to the I signal or the Q signal; and

a subtraction subject signal selector that selects the user signal to which the pseudo noise addition subject signal selecting means has selected to add the pseudo noise as the user signal to be supplied to the second subtractor.

31. (Previously Presented) A program of instructions for execution by a computer to perform an error measurement process of an orthogonal modulation device having: an adder that outputs a pseudo noise superimposed signal obtained by adding a pseudo noise to a user signal; a signal converter that mixes the pseudo noise superimposed signal with a local signal at a predetermined local frequency, and outputs a converted signal; a phase shifter that outputs a phase shifted local signal obtained by shifting the phase of the local signal; a phase shifted local signal multiplier that multiplies the converted signal by the phase shifted local signal; and a correlator that obtains a correlation between an output from the phase shifted local signal multiplier and the pseudo noise, the error measurement process comprising:

measuring an error of the user signal based on an output from the correlator.

32. (Previously Presented) A computer-readable medium having a program of instructions for execution by a computer to perform an error measurement process of an orthogonal modulation device having: an adder that outputs a pseudo noise superimposed signal

obtained by adding a pseudo noise to a user signal; a signal converter that mixes the pseudo noise superimposed signal with a local signal at a predetermined local frequency, and outputs a converted signal; a phase shifter that outputs a phase shifted local signal obtained by shifting the phase of the local signal; a phase shifted local signal multiplier that multiplies the converted signal by the phase shifted local signal; and a correlator that obtains a correlation between an output from the phase shifted local signal multiplier and the pseudo noise, the error measurement process comprising:

measuring an error of the user signal based on an output from correlator.

33. (Previously Presented) A modulation device comprising:

an adder that outputs a pseudo noise superimposed signal obtained by adding a pseudo noise to a user signal; and

a correlator that obtains a correlation between a modulated signal obtained by modulating an output from the adder and the pseudo noise.